CEILING SYSTEM WITH VERTICAL SPACE DIVISION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to a ceiling system useful in an open building environment. More particularly, the present invention relates to a suspended ceiling that is readily reconfigurable while being operable with adjustable vertical partitions or other functional elements.

Background Art

In the space above the head of an individual, conventional drop-down ceiling panels have been used to conceal various functional structures. These ceiling panels have also been implemented for various aesthetic purposes. Generally, these ceilings include runners and interconnecting cross-members which support a plurality of ceiling tiles. The ceiling tiles define a space between the architectural ceiling which can accommodate air conditioning ducts, plumbing and electrical fixtures. However, these ceiling structures can have certain disadvantages. For example, they can collect dust and dirt and limit the penetration of natural outdoor light. These ceiling structures can also fail to provide easy access to the building infrastructure located therein. In addition, drop-down ceiling structures can create a homogeneous environment that lacks certain functionality, e.g., place marking functions and an aesthetical appeal.

Traditional methods for configuring vertical walls within a workspace include the use of modular vertical partitions to divide a larger workspace into smaller semi-private workspaces. Conventional known office systems use rigid wall panels or partitions to subdivide a workspace. These systems are convenient but have limitations in the functionality they can add

to a workspace, especially in the utility of the overhead space. In particular, these traditional vertical walls can lack adaptability for temporary space division. In addition, traditional vertical walls can lack ready adaptability for use with information display elements, e.g., display screens or monitors.

In the area of a workplace environment, there continues to be a need to improve the utility of the workspace, including the space above and around a worker. However, most previously existing systems do not include an overhead ceiling that provides natural light in an environment with easy access to various fixtures located thereabove. In addition, most previous systems lack elements that are readily reconfigured to suit the needs of a user.

SUMMARY OF THE INVENTION

The present invention is directed to an improved ceiling system with a vertical partition that provides a flexible and highly functional space within an open building environment. The present invention is easily reconfigured and uses material coverings based on occupants' needs and generally provides for an increased functionality of the building space.

According to a first aspect of the present invention, a ceiling system with a vertical partition for providing space division in an open plan building environment is provided. The ceiling includes a frame defining an interior portion and a generally light weight member extending across the interior portion. A plurality of anchor members connect the ceiling system to a top surface. A reconfigurable vertical partition member is connected to the ceiling.

According to another aspect of the invention, a ceiling system with a vertical partition for providing space division in an open plan building environment is provided. The ceiling includes a frame defining an interior portion and a panel member extending across the interior portion. The panel member is generally formed from a light weight material. A plurality

of anchor members attach the ceiling system to a top surface. A reconfigurable vertical partition member is connected to the frame of the ceiling and extends downward therefrom.

According to a further aspect of the invention, a reconfigurable ceiling system with a vertical partition for providing space division in an open plan building environment is provided. A plurality of anchor members are connected to a top surface of a workspace. A plurality of suspension members are connected to some of the anchors. A reconfigurable ceiling is connected to the suspension members. The ceiling includes a frame defining an interior portion and a generally light weight member extending across the interior portion. A reconfigurable vertical partition member is connected to the ceiling. The ceiling system is reconfigurable by connecting the ceiling and suspension members to selected anchors and readily movable to reconnect the ceiling to different anchors in order to reposition the ceiling to suit the needs of a user.

As used herein the term "connected to" is intended to be interpreted broadly and to include direct and indirect connections.

As used herein the term "vertical partition" is intended to be interpreted broadly and to include various divider element capable of including additional functionality such as displays or marker boards.

The resent invention, together with attendant objects and advantages, will be best understood with reference to the detailed description below in connection with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a perspective view of a ceiling system with vertical partitions in accordance with a first embodiment of the present invention;

FIG. 1B is a perspective view of another embodiment of a ceiling system as shown in FIG. 1A and also including an adjustable ceiling/panel system;

FIG. 2A is an enlarged view of the ceiling frame and attachment elements for the vertical partitions as illustrated in FIG. 1;

FIG. 2B is a cross-section of a ceiling frame and an attached ceiling panel;

FIG. 3A is a perspective view of a first embodiment of a vertical partition in a first position;

FIG. 3B is a perspective view of the first embodiment of a vertical partition in a second position;

FIG. 3C is a partially broken away view of the first embodiment of the vertical partition illustrating an adjustment member or telescoping portion of the partition;

FIG. 4A is a perspective view of a second embodiment of a vertical partition illustrated in FIG. 4A illustrating the reconfigurability of the partition; and

FIG. 5 is a perspective view of a third embodiment of a vertical partition.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention is described with reference to the drawings in which like elements are referred to by like numerals. The relationship and functioning of the various elements of this invention are better understood by the following detailed description. However, the embodiments of this invention as described below are by the way of example only, and the invention is not limited to the embodiments illustrated in the drawings. It should also be understood that the drawings are not to scale and in certain instances details have been omitted which are not necessary for an understanding of the present invention, such as conventional details of fabrication and assembly.

Referring now to the drawings and initially to FIG. 1A, a workspace 10 is shown that utilizes one embodiment of a suspended ceiling system 20 in accordance with the present invention. The suspended ceiling system 20 provides a system for a readily changeable division of space while being adaptable for use with new and emerging technologies. In addition, the ceiling system 20 provides an aesthetic environment that is highly functional. For example, the ceiling system 20 is readily reconfigurable while providing easy access to various functional elements such as electrical or communications cabling or HVAC or plumbing elements. In known building environments the ceiling is installed and remains generic for the life of the building. The ceiling system 20 is reconfigurable to respond to the needs of the occupants of the space.

With particular reference to FIG. 1B, the workspace 21 includes at least one worksurface 22 and other furniture such as seating elements or chairs 24. The workspaces 10 (FIG. 1A) or 21 (FIG. 1B) may include work tools or instruments such as a computer or the projector 26. An adjustable ceiling or panel system 20 is shown in FIG. 1B. The ceiling system 20 may be useful in an office environment with the adjustable panel system 30. For a further description of the adjustable panel system 30, reference is made to U.S. Provisional Patent Application No. 60/335,582, filed on October 24, 2001, in the name of Robert Insalaco et al., the disclosure of which is hereby incorporated by reference. It should be recognized that the workspaces 10 (FIG. 1A) or 21 (FIG. 1B) are only exemplary and the invention may be fully realized in other arrangements of office environments, as well as in other work environments, such as a factory, a warehouse, a laboratory, etc.

Referring back to FIG. 1A, the ceiling system 20 includes light weight panel members 32 that extend generally horizontally above the head of a standing worker. The ceiling

system 20 is suspended from a top surface, e.g., the architectural ceiling, by support members 33. The support members 33 include anchors 34 connected to the top surface. A steel suspension cable 35 is connected to the anchor 34. A suspended steel support tube 36 is adjustably fixed in place along the cable 35. The end of the cable 35 is connected to a bracket 37. The ceiling system 20 extends generally horizontally in an upper portion 40 of the workspaces 10 or 21, generally above the head of a standing worker. By "extending generally horizontally," it is meant that, in the aggregate, the ceiling systems 20 extend predominantly in the horizontal direction, such as generally parallel to the floor or the architectural ceiling. Similarly, the phrase "generally above the head of a standing worker" means that in the aggregate, the plurality of panel members 32 generally or predominantly are positioned at a height above the height of an average standing worker. However, as shown in the drawings, the vertical partitions 40, 42, 44 extend from the ceiling system 20 down toward a base surface.

The ceiling system 20 includes a frame 50 that defines an interior portion 51. The frame 50 includes a front member 52A, a rear member 52B and side members 52C and 52D. The frame 50 is preferably formed from materials such as steel or aluminum rectangular tubing. A panel member 32 is connected to the frame 50 and extends across the interior portion 51. In the preferred embodiment, the panel member 32 is formed from a light weight, flexible or expandable material such as LYCRA® or other known flexible materials. Other known materials may also be implemented with the present invention including thin plastic materials, nylon mesh or steel mesh. Furthermore, different panel members 32 within the ceiling system 20 may be made from different materials and have different structural or functional characteristics depending upon the needs of a particular user.

As shown in FIG. 2B, the panel member 32 is attached to the ceiling frame 50 with the use of an L-shaped extrusion 58 and a connector or rivet 59. As illustrated in FIG. 2B, the L-shaped extrusion 58 is sewn or bonded onto an edge of the panel member 32. The panel member 32 is wrapped around a portion of the frame 50 with the rivet 59 fit within aligning openings in the extrusion 58 and the frame 50. Accordingly, the panel member 32 is easily installed and may also be readily replaced as needed. Moreover, the panel member 32 may be easily removed for cleaning.

The ceiling system 20 is preferably assembled after shipping and assembled in the building space where it will be used. The ceiling system 20 is sized in order to be readily moved within the selected workspace. The ceiling system 20 is capable of easy assembly and disassembly. It can be assembled on the floor or a base surface and raised into place by the installers. The panel member 32 can be incorporated or be useful with additional functions. For example, a digital image may be printed on the panel member 32, or the partitions 40, 42, 44. The panel member 32 and/or the partitions 40, 42, 44 may incorporate additional functionality, e.g., acoustical functions such as sound masking or sound creating/enhancing, or embedded passive display technologies or lighting elements such as various light emitting diodes including O.L.E.D., T.O.L.E.D. and F.O.L.E.D.

Referring to FIG. 1A, three embodiments of vertical partitions 40, 42, 44 are illustrated. It should be recognized that other shapes or configurations for the partitions 40, 42, 44 come within the scope of the present invention. The rectangular partition 40 is shown in greater detail in FIGS. 3A – 3C. The rectangular partition 40 includes a frame 60 having side members 62, 64 and a bottom member 66. Base elements 67 include cavities adapted to engage the side members 62, 64 and the bottom member 66 and secure these elements together. A

conventional threaded foot screw may be secured into the base elements 67 for further adjustment. The side members 62, 64 include two telescoping or adjustment portions 68 in order to provide the partition 40 with a height adjustment capability. The bottom member 66 includes a telescoping portion 69 to provide a width adjustment capability. With reference to FIG. 3C, the telescoping portions 68 include a top tube 70 and a bottom tube 71 that slidably mate with each other. A cap 72 having a threaded inner surface portion engages a correspondingly threaded surface on the support member 73. A nylon bushing 74 is located above the support member 73 and includes a tapered surface sized to mate with a correspondingly tapered surface on the support member 73. A nylon sleeve 75 surrounds the top tube 70 and prevents scratching of the top tube 70. In operation, by rotating the cap 72, the bushing 74, particularly the tapered portion, is pressed into or out of engagement with the tapered portion of the support member 73. As a result, the bushing 74 is pressed into or released from engagement with the top tube 70 thereby secures the top tube 70 in the desired position. Accordingly, the height adjustment capability allows for the partition 40 to be readily adjusted to different heights to accommodate different heights between a base surface, e.g., a floor and the ceiling frame 50.

The width of the bottom member 66 can be adjusted by using the corresponding telescoping portion 69. The telescoping portion 69 includes two tubes 76, 77 that slidably engage each other in order to be set at a desired width. A cap 78, bushing 79, sleeve 80 and support member 81 operate in the same essential manner as described with respect to the telescoping portions 68. The telescoping portion 69 provides for a width adjustment feature that operates in essentially the same manner as the height adjustment feature. Accordingly, the partition 40 can be adjusted to provide different widths thereby creating different appearances for the partition 40 as generally illustrated in FIGS. 3A – B.

FIG. 4A illustrates a second or end partition 42. The end partition 42 is constructed in essentially the same manner as the first partition 40. The end partition 42 includes end partition panels 90. The end partition panels 90 can be formed from the same general materials used to form the other panels of the present invention. A frame 94, preferably formed from .25" diameter flexible fiberglass rod, is connected to the rod 96 and the hooks 98. The hooks 98 provide for the attachment to ceiling frame 50 as illustrated generally in FIG. 2. The rod 96 provides a surface along which the clasping portions 102, 104 of the side members 108, 110 may be slid in order to provide a different shape for the partition 42. The telescoping portions 114 provide for height adjustment in essentially the same manner described with respect to the partition 40 of FIGS. 3A – 3B. The telescoping portions 116 provide for width adjustment. The embodiment of FIG. 4B operates in essentially the same manner as the embodiment of FIG. 4A with the rods 120 added to flex panels 90 inwardly or outwardly creating three-dimensional shapes. The rods 120 are preferably constructed from .25" diameter flexible fiberglass rod. These flexible rods 120 create an improved aesthetic for partition 42 and can also be used to alter the acoustic environment of the space by redirecting sound waves.

FIG. 5 illustrates rotatable partition 44. The rotatable partition 44 is formed in the same general manner as the partitions 40, 42. The rotatable partition 44 includes a rotatable partition panel 150. The rotatable partition panel 150 can be formed from the same general materials used to form the other panels of the present invention. A frame 152 is connected to the cylinder 158 by means of conventional fastening items such as a nut and washer. The hooks 156 provide for the attachment of the partition 44 to the ceiling frame 50 as illustrated generally in FIG. 2. The cylinder 158 provides for a rotational connection between the frame 152 and the

panel 150 and the ceiling frame 50. Accordingly, the partition 44 may be rotated to suit the needs of a particular user.

The embodiments described above and shown herein are illustrative and not restrictive. The scope of the invention is indicated by the claims rather than by the foregoing description and attached drawings. The invention may be embodied in other specific forms without departing from the spirit of the invention. For example, other adjustment or rotation mechanisms could be used with the partitions of the present invention. In addition, the particular shapes of the partition members could be varied while still achieving the required functionality. Accordingly, these and any other changes which come within the scope of the claims are intended to be embraced herein.